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(54) Fluid dispensing device with continuously variable dosage selection.

(57) There is provided a dosage measuring and dispensing device (1) for fluids with a dosage cup (2) connected to a fluid reservoir (4) through a dip tube (16) where the dip tube (16) connects to an extension (17) and a column (38) within the dosage cup (2) where the extension (17) and column (38) are in a slidable engagement and each has a groove (20, 41) which are angularly arranged relative to each other and intersect to form an orifice which connects the dip tube extension (17) to the dosage cup (2). When the positions of the column (38) and extension (17) are changed the height of the aperture in the dosage cup (2) is continuously raised or lowered so that the level of fluid in the cup (2) is continuously varied and any excess fluid above the level of the aperture is returned to the dip tube (16) and the reservoir (4), but the fluid lower than the aperture is retained within the dosage cup (2), to provide an accurately measured volume of fluid.

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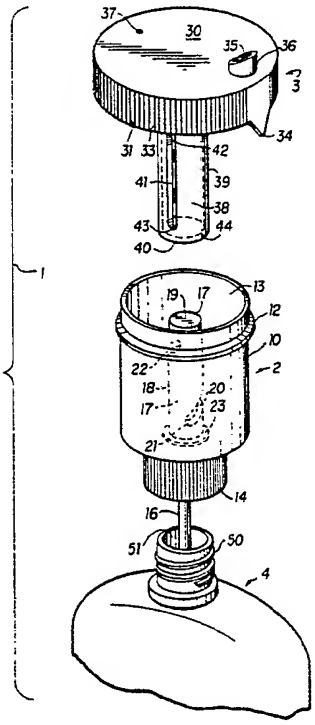

FIG. 1

FLUID DISPENSING DEVICE WITH CONTINUOUSLY VARIABLE DOSAGE SELECTION

BACKGROUND OF THE INVENTION

U.S. Patent 3,581,853 to Donoghue provides for a dosage cup situated on a squeeze bottle containing a fluid to be dispensed. The dosage cup provides for the measurement of a single dose of fluid when the squeeze bottle forces fluid into the cup and also provides that any excess fluid beyond the single measured dose is returned to the squeeze bottle. U.S. patent 4,143,794 to Stratford et al. provides for a squeeze bottle with a dosage cup within which resides an extension of the dip tube of a squeeze bottle and a dose determining means whereby a series of holes are provided for in the extension and the dose determining means, and the rotation of the dose determining means causes the holes to be selectively aligned so that discrete doses can be provided. The instant invention is an improvement over the prior art in providing for a continuously variable selection of dose volumes.

SUMMARY OF THE INVENTION

This invention is concerned with an improvement in the dispensing of fluid materials from a squeeze bottle whereby the dose which is selected is variable over a continuous range of dosages. Thus, it is an object of the instant invention to describe the squeeze bottle for dispensing fluids through the continuously variable dosage cup. It is a further object to describe the functioning of the dosage cup with the dip tube inserted into the squeeze bottle and reservoir of fluid and the engagement of the extension of the dip tube and the downwardly projecting column to provide for the continuous selection of dose volumes within the dosage cup. A still further object of this invention is to describe the grooves in the extension and the column which intersect to provide for the orifice of variable height within the dosage cup to provide for the selection of the level of fluid within the dosage cup. Further objects will become apparent from a reading of the following description.

DESCRIPTION OF THE INVENTION

This invention provides for an improved device for dispensing variable volumes of fluids, generally as liquids, although occasionally as flowable powders from a container. These devices are particularly suited for the dispensing of liquid or powdered medicaments to be topically applied to animals or concentrated medicaments for further dilution and administration to a number of animals but could equally well be used for the dispensing of oral liquid medicaments for animals or humans. Further uses could include the dispensing of liquid fertilizers, insecticides fungicides or weed killers for agricultural uses or detergents, waxes, or oils for household uses.

The preferred use of the device of this invention is for the topical application of animal insecticides. Generally such topically applied products are applied to the back, along the midline, of the animal being treated. Cattle and sheep are most commonly treated, however, horses, goats, swine, and companion pets, such as dogs and cats can also be treated. The active ingredient in such cases is intended to have systemic effects by the absorbance of the drug through the skin of the animal. To ensure that the product is utilized most efficiently by providing the optimum dose without either underdosing, which can result in a lack of efficacy, or overdosing, which can cause at the least a waste of product, but may lead to toxic effects caused by overdosing, the instant device finds utility in being able to exactly dispense the volume of active ingredient required for the particular weight of the animal. Previous devices with only a discrete number of dosages to select from would overdose some and underdose other animals with the proper dose given to very few animals.

Accordingly, this invention provides for an improved dosing device for fluids which provides for a reservoir of fluid material in a compressable or "squeeze" bottle with a dip tube extending from the bottom of the bottle to the fluid dispensing device to which it is affixed. An extension in fluid connection with the dip tube leads to and is within a dosage cup, the extension being constructed with a groove enabling fluid to pass from within the extension into the dosage cup. The groove is oriented generally lengthwise along the extension with an upper end and a lower end such that the upper end is higher within the dosage cup than the lower end. A downwardly projecting column is provided which is in slidable engagement with the extension, and which also has a groove which will enable fluid to pass therethrough. The groove in the column is also generally oriented lengthwise along the column with an upper end and a lower end such that the upper end is higher within the dosage cup than the lower end. The extension and downwardly projecting column are generally cylindrical in shape however, the column and extension could also be manufactured in the shape of matching truncated cones. The upper end of the extension and the

lower end of the column can be slightly smaller then the opposite ends to facilitate manufacture and provide good surface contact.

The groove in the column and the extension are oriented such that when the column and extension are in slidable engagement with each other the grooves are placed in an angular and intersecting arrangement to expose an orifice where they intersect. The column is rotatable between positions to continuously vary the selection of the point of the intersecting grooves to cause the orifice to vary its height within the dosage cup.

The continuously variable height of the orifice allows for a continuously variable volume of liquid to be selected by rotating the column between positions which expose the aperture at a minimum height or a maximum height and continuously therebetween within the dosage cup. The fluid is placed in the dosage cup by applying pressure to the fluid in the reservoir, as by squeezing a flexible container which will cause the fluid to flow up the dip tube and into the extension. The fluid will rise in the extension until it reaches the orifice which had been previously selected for its height within the dosage cup by rotating the column until the intersecting grooves meet at the proper height. The fluid will flow through the orifice and into the dosage cup until the fluid reaches the level of the orifice. This will be the desired dose. When pressure is released on the squeeze bottle air will flow through the orifice to replace the volume of fluid removed from the bottle. If excess fluid, higher within the dosage cup than the selected level of the orifice, is placed into the dosage cup, when the pressure on the squeeze bottle is released, fluid above the height of the orifice will be drawn back through the orifice until the level of the fluid is at the height of the orifice. Then air will be drawn into the bottle to replace the fluid removed. In such a manner, when a particular dosage is selected, the volume in the dosage cup will always be exactly determined in a continuous manner between the maximum and minimum dosages provided.

The dosages are determined within the dosage cup by the intersection of the groove on the extension with the groove on the column. The intersection is caused by arranging one of the grooves in an angular relationship with the axis of the extension or the column. Generally the groove will form a helix about the axis of the extension or column. The corresponding groove could be a straight groove generally parallel with the axis of the extension or column, however both grooves could be angular or helical in configuration. To effect an intersection of such grooves, the two-helix arrangement would have one of the helices in the form of a right-handed thread and the other helix in a left-handed thread. In this manner, an effective intersection occurs with a sharply defined orifice through which the fluid is dispensed. In general, any arrangement of grooves is possible so long as the grooves are caused to intersect by the rotational movement of the column about the extension.

The extension may be constructed to fit inside or outside of the column with the column extending substantially to the bottom of the inside of the dosage cup. It is preferred to have the column contact the bottom of the cup, either inside or outside of the extension since such an arrangement provides for a better fluid seal between the inside of the extension and downwardly projecting column and the inside of the cup. The fluid seal of the bottom of the downwardly projecting column is improved by ensuring that firm contact is made between the bottom surface of the downwardly projecting column and the top surface of the bottom of the cup, or the top surface of a flange situated in the bottom of the cup. One way to ensure such contact is to manufacture the downwardly projecting column so that it is slightly longer then the depth of the cup. In this manner when the cup is installed on the doseage cup, the slightly longer length of the downwardly projecting column, coupled with the inherent flexibility of the plastic materials of which the dosage dispensing device is constructed, will ensure that pressure is exerted on the contact surface of the downwardly projecting column and the bottom surface or flange in the cup, thus providing for an efficient seal. The longer length of the downwardly projecting column is preferably to the extend of from 0.1 to 1.0 mm.

By providing for an efficient seal at the contact surface of the bottom of the downwardly projecting column and the top surface of the inside bottom surface or flange of the cup, the tolerences of the sidewall contact surfaces of the extension and the downwardly projecting column can be lessened. Such an arrangement is preferred since the larger surface areas of the sidewall contact surfaces would provide for greater frictional resistance to the rotation of the cap and downwardly projecting column about the extension. Greater facility of rotation of the cap is provided for with an efficient seal arrangement of the bottom of the downwardly projecting column with the top surface or flange at the inside bottom of the cup.

The grooves will extend from the lowest dose possible near the bottom of the cup, to the highest dose possible nearest the top of the cup. The grooves will preferably both be coextensive with the range of dosages from the lowest to the highest since extending one groove higher or lower than the other will not enable an intersection to occur beyond the less extensive groove; thus no orifice will be formed.

The dosage cup will also be fitted with a cap which contains a dispensing spout with which to pour the selected dose from the cup and it is further beneficial if the cup is fitted with a vent to permit air to enter the cup at the same time that the fluid material is being poured out of the dispensing spout.

The cap of the dispensing cup is preferably integral with the downwardly projecting column in order to facilitate the rotation of the column about the extension. Other arrangements could involve the upper end of the downwardly projecting column to project through the cap and allow the rotation of the column independently of the cap. The integral arrangement of column and cap is preferred because of simplicity of construction and the leverage and finer level of control which is gained with such an arrangement. Further, the cap can, in conjunction with the outside of the dosage cup, be fitted with a pointer and scale to assist in the accurate determination of the dosage to be selected. In addition, the juncture of the cap and dosage cup could be equipped with means to restrict the rotation of the cap so that the range of intersecting grooves would not be exceeded or exceeded only to the point of providing a position of non-intersecting grooves which can operate as a stop or shut-off position. Such a stop position could conveniently be indicated by a graphic display of the indicator or by a detent, or by both. Further, major divisions of the scale could be provided with detents to provide for a rapid determination of the dosages used most often.

In a further embodiment of the instant invention the extension can be constructed in a truncated fashion such that the top surface of the extension rises from a low point to a high point within the dosage cup and fits either inside or outside of the column. Generally the top surface of the extension will rise helically within the extension. In such a situation the orifice normally found where the two grooves intersect is thus an elongated orifice consisting of the continuously varying length of the upper portion of the groove extending from the top surface of the extension where it intersects with the groove of the column, to the upper end of the groove on the column. In operation, such an arrangement would function in the same manner as when two intersecting grooves are employed.

The invention may be performed in various ways and preferred embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings.

In the accompanying drawings:

Figure 1 is an exploded view of the fluid dispensing device showing the fluid container, the dispensing cup and the dose determining means.

Figure 2 is a cross-section of the fluid dispensing device, assembled and installed on the fluid container.

Figure 3 is a partial cross-section of the dose determining means of the fluid dispensing device.

Figure 4 is a cross-section of Figure 3 taken along the lines and in the direction of line 4-4.

Figure 5 is a cross-section of another embodiment of the fluid dispensing device.

Figure 6 is an exploded view in partial cross-section of the device of Figure 5.

Referring specifically to Figures 1 and 2, the complete fluid dispensing device 1, is shown in greater detail, comprising a dosage cup assembly 2, fitted with a cap assembly 3. The dosage cup assembly 2, is in threaded engagement with the fluid container 4.

The dosage cup assembly 2 comprises a sidewall 10 with a bottom wall 11 enclosing a space 13. The sidewall 10 is affixed with attachment means 12 for engaging the cap assembly 3. Preferably the attachment means 12 are formed on the outside of side wall 10. The bottom wall 11 is integrally formed on the outside thereof with threaded attachment means 14 for engagement with corresponding threaded attachment means 50 on the fluid container 4.

The bottom wall 11 is also fitted with an opening 15 which is connected on the outside of the bottom wall 11 to a dip tube 16. The dip tube 16 extends through the neck 51 of the fluid container 4. The dip tube extends substantially to the bottom of the fluid container when the dispensing cup assembly 2 is affixed to the fluid container 4, upon the engagement of threaded attachment means 14 and 50 of the dispensing cup assembly 2 and the fluid container 4.

The opening 15 in the bottom wall 11 of the dispensing cup assembly 2 is fitted on the inside thereof with an extension 17. The extension 17 consists of a substantially cylindrical outer wall 18 and a top wall 19. The outer wall 18 has a groove 20 therethrough which generally extends from a lower end 21 to an upper end 22 in a curved manner such that the groove 20 is substantially helical in nature. The groove 20 will extend for less than one full revolution about the outer wall 18 of the extension 17.

The extension 17 is also fitted at its lower end with a flange 23 which places the extension 17 and thus the groove 20 at the appropriate height within the dosage cup assembly so that accurate, reproducable and predictable dosages can be determined. The lower end of the extension 17 is also fitted with anchoring means 24 within the bottom wall 11 to prevent any leakage of fluid either into or

out of the dispensing cup assembly 1 which would adversely effect the accuracy of the volume of fluid dispensed. Alternatively, the anchoring means 24 as well as the extension 17 itself could be made integrally with the dispensing cup assembly 1 as a one-piece construction.

The cap assembly 3 consists of a top portion 30 with a circumferential side wall 31 attached to the top portion 30 at the outer edge thereof. The inside of the downwardly projecting side wall 31 has locking means 32 for engagement with the corresponding locking means 12 on the outer wall 10 of the dispensing cup assembly 2. Since the cap assembly 3 is designed to rotate about a vertical axis about the dispensing cup assembly, continuous circumferential locking means on either the side wall 10 or the downwardly projecting side wall 31 is preferred. In order to reduce the hoop strength of the locking means 12 and 32 during assembly it may be advantageous to manufacture one of the locking means in a non-continuous or interrupted fashion. This would facilitate the mating of the two locking means 12 and 32. The downwardly projecting side wall 31 may also be fitted with gripping means to facilitate the rotation of the cup assembly 3, such as a series of vertical cuts 33.

The downwardly projecting side wall 31 also contains a dosage indicator 34 which will indicate the dosage selected by its alignment with a series of volume indicators (not shown) on the outside of the sidewall 10. In addition to volume, the dosage could be indicated in the size or weight of animals which are to be treated with a particular volume of fluid. Where the contents of the container are in a concentrated form, the indicators could define the number of animals treated with a particular volume of fluid.

The top portion 30 is also fitted with an orifice 35 and a dispensing spout 36. To assist in the dispensing of the fluid, the top portion 30 also contains a vent hole 37 which is generally located diametrically opposite the orifice 35 and dispensing spout 36.

The cap assembly 3 is either fitted with or is integral with a downwardly projecting column 38 which consists of a substantially cylindrical side wall 39 which is open or has an opening 40 at the bottom edge thereof. The inside diameter of the downwardly projecting column 39 is substantially the same as the outside diameter of the extension 17, and extends at least to below the lower edge 21 of the groove 20 in the extension 17.

The downwardly projecting column is also fitted with a groove 41 therethrough which is generally vertically arranged in the cylindrical side wall and which has an upper end 42 and a lower end 43. When the cap assembly 3 is affixed to the dispensing cup assembly 2, the downwardly projecting column 38 is fitted snugly about the extension 17 and the upper ends 22 and 42 and the lower ends 21 and 43 of the two grooves 20 and 41 are at substantially the same height from the bottom wall 11 of the dispensing cup assembly 2. In addition, the helical groove 20 of the extension 17 and the vertical groove 41 of the downwardly projecting column 38 intersect at a single point and form an orifice 60 which will vary in height within the dosing cup assembly as the cap assembly 3 is rotated. The rotation of the cap assembly causes the mutual angular displacement of the extension relative to the downwardly projecting column. The bottom surface 44 of the downwardly projecting column 38 contacts the top surface 25 of the flange 23 to form a seal between the inside of the extension and downwardly projecting column and the inside of the cup.

The assembly of the dip tube 16 and the extension 17 to the opening 15 allows fluid communication between the fluid container 4 and the inside of the extension 17. Likewise the close fit of the inside of the downwardly projecting column 38 with the outside of the extension and the engagement of the two grooves 20 and 41 to produce a single orifice 60 through both of the sidewalls 18 and 39 of the extension 17 and downwardly projecting column 38 respectively allows for fluid communication between the inside of the extension 17 and the inside of the dispensing cup assembly 2. The arrows show the direction of fluid flow during the procedure of filling the dispensing cup assembly. With the fluid container 4 generally of the deformable or "squeeze bottle" type, pressure applied to the sides of the fluid container causes fluid to rise in the dip tube 16, pass through the opening 15 and enter the inside of the extension 17. The fluid will continue to rise in the extension 17 until it reaches the level of the orifice 60 whereupon the fluid enters the dispensing cup assembly. The fluid will rise in the dispensing cup assembly 2 until it reaches the level of the orifice 60 or even beyond if continued pressure is applied to the fluid container 4. When the pressure on the fluid container is released the upward fluid flow will cease and, due to the resiliency of the fluid container 4, a partial vacuum will be created which will draw fluid from the extension. If fluid in the dispensing cup assembly 2 is at a level higher than the orifice 60, the partial vacuum will draw fluid through the orifice 60, into the extension 17, and the dip tube 16, returning such fluid to the fluid container 4. When the fluid level in the dispensing cup assembly is lowered to the level of the orifice 60, no further fluid can be returned to the fluid container 4 through the extension 17 and air will enter the orifice 60 and extension 17, into the fluid container 4 to replace the volume of fluid dispensed into the

fluid dispensing cup 2. The fluid in the dispensing cup assembly 2 is removed therefrom by tipping the complete fluid dispensing device 1 to allow the fluid to pass through the opening 35 and dispensing spout 36. To ensure the accuracy of the dose, the cap may be rotated to the shut-off position prior to emptying the cup.

In Figure 3 and 4 a partial view of the dispensing device is shown consisting of the mated extension 17 and downwardly projecting column 38 showing the close fit of the inside surface of the cylindrical side wall 39 of the downwardly projecting column 38, and the outside surface of the outer wall 18 of the extension 17 as well as the close fit of surface 25 of the flange 23 with surface 44 of the downwardly projecting column 38. The arrows show the direction of the fluid during the procedure of filling the dispensing cup assembly, and the rotation of the cup assembly 3 with its downwardly projecting column 38 about the cup dispensing assembly 2 and its extension 17.

In figures 5 and 6 an alternate embodiment of the fluid dispensing device 1 is shown where the modification occurs in the extension 17 and the downwardly projecting column 38. The extension 17 consists of a sidewall 18 which has a top surface 29 in a generally curved shape of increasing height within the dispensing cup assembly 2. The top surface 25 of the extension 17 generally forms a helical curve along the sidewall 18 of the extension 17 and completes up to one revolution about the side wall 18. If the top surface 25 of the extension 17 completes less than one revolution of a helix about the sidewall 18, a non-curved portion 26 of the top surface 25 may result.

The cup assembly 3 contains a downwardly projecting column 38 with a groove 41, an opening 40 at the bottom thereof, and the outside diameter of the downwardly projecting column 38 is substantially the same as the inside diameter of the sidewall 18 of the extension 17.

When the cup assembly 3 is installed on the dispensing cup assembly 2, generally the downwardly projecting column 38 fits within the extension 17 and the groove 41 intersects the top surface 25 of the extension at a point determined by the degree of rotation of the cap assembly 3 about the dispensing cap assembly 2. When the fluid container is squeezed and fluid rises in the dip tube 16, it passes through the opening 15, into the extension 17, and out the groove 41 to the extent such groove extends higher than the top surface 25. When the fluid returns to the fluid container 4, the fluid below the intersection of the top surface 25 with the grooves 41 is retained in the dispensing cup assembly 2 for subsequent dispensing.

The fluid dispensing device may be made of plastic materials suitable for injection molding such as polyethylene or polypropylene which should be inert to the fluid materials which are intended to be dispensed. The use of such injection molding resins will provide for the inexpensive and facile manufacture of the dosing device, yet will still provide for the dimensional accuracy which is required for the administration of medicinal fluids. Further, since the containers upon which the instant caps are installed may be refilled with fluid from a large stock container, the use of such materials will provide for the durability necessary for such prolonged operation.

Claims

1. A dose measuring device for fluids which comprises a dosage cup with a dip tube having an extension situated within the dosage cup, the extension being constructed to enable fluid to pass from the dip tube into the dosage cup through the extension where the extension is provided with a groove allowing fluid to pass therethrough, said groove having a lower end and an upper end wherein the groove is oriented along the extension to connect the lower end with the upper end; and a downwardly projecting column in slidable engagement with the extension, said downwardly projecting column also providing with a groove allowing fluid to pass therethrough, said groove having a lower end and an upper end wherein the groove is oriented along the downwardly projecting column to connect the lower end with the upper end, with the groove in the extension and the groove in the downwardly projecting column placed in an angular and intersecting arrangement with each other when the downwardly projecting column and the extension are slidably engaged and the downwardly projecting column is movable between positions for an infinitely variable selection of intersection points of the two grooves to expose an orifice of continuously varying height within the dosage cup allowing fluid to pass from the dip tube into the dosage cup and return of any excess fluid through the orifice and into said dip tube.

2.The dose measuring device of Claim 1 wherein one of the grooves on the extension or the downwardly projecting column is helical in shape and the groove on the other of the downwardly projecting column or extension in generally longitudinal in nature.

3. The dose measuring devices of Claim 1 wherein both of the grooves on the extension and downwardly projecting column are helical in shape provided that each helical groove is the opposite direction from the other.

4. The dose measuring device of Claim 1 wherein the upper ends of both grooves are situated at substantially the same height within the dosage cup and that the lower ends of both grooves are also situated at substantially the same height within the dosage cup.

5. The dose measuring device of Claim 4 wherein the lower end of the grooves are situated near the bottom of the dosage cup and the upper end of the grooves are situated near the top of the dosage cup.

6. The dose measuring device of Claim 1 which is attached to a fluid container with flexible sidewalls to enable fluid to rise in the dip tube caused by the increase in pressure on the fluid in the container caused by the compression of the flexible sidewall.

7. The dose dispensing device of Claim 1 wherein downwardly projecting column is integral with a cap of the dosage cup.

8. The dosage dispensing device of Claim 7 wherein the cap contains a spout for the removal of the contents of the dosage cup.

9. The dose dispensing devices of Claim 8 wherein the cap also contains a vent to assist in the removal of the contents of the dosage cup.

10. The dose dispensing device of Claim 7 wherein the cap contains a dosage indicator and the dosage cup contains a scale for preselecting the dose to be dispensed.

11. The dose dispensing device of Claim 1 wherein the outside diameter of the extension is substantially the same as the inside diameter of the downwardly projecting column.

12. The dose dispensing device of Claim 1 wherein the inside diameter of the extension is substantially the same as the outside diameter of the downwardly projecting column.

13. The dose dispensing device of Claim 1 where one of the grooves extends along the extension or downwardly projecting column beyond the extent of the other groove to provide a position where no orifice is formed.

14. A dose measuring device for fluids which comprises a dosage cup with a dip tube having an extension situated within the dosage cup, the extension being constructed to enable fluid to pass from the dip tube into the dosage cup through the extension where the extension is provided with a top surface allowing fluid to pass over said top surface where said top surface rises from a low point to a high point within the dosage cup; and a downwardly projecting column in slidable engagement with the extension, said downwardly projecting column provided with a groove allowing fluid to pass therethrough, said groove having a lower end and an upper end wherein the groove is oriented along the downwardly projecting column to connect the lower end with the upper end, with the top surface of the extension and the groove in the downwardly projecting column placed in an angular and intersecting arrangement with each other when the downwardly projecting column and the extension are slidably engaged and the downwardly projecting column is movable between positions for an infinitely variable selection of intersection points of the top surface of the extension and the groove of the downwardly projecting column to expose a continuously varying length of the upper portion of the groove within the dosage cup allowing fluid to pass from the dip tube into the dosage cup and return of any excess fluid through the exposed upper portion of the groove and into said dip tube.

15. The dose measuring device of Claim 14 wherein the top surface of the extension is helical in shape.

16. The dose measuring device of Claim 14 wherein the lowest point of the top surface of the extension is situated near the bottom of the dosage cup and the highest point of the top surface of the extension is situated near the top of the dosage cup.

17. The dose measuring device of Claim 14 wherein the outside diameter of the extension is substantially the same as the inside diameter of the downwardly projecting column.

18. The dose measuring device of Claim 14 wherein the inside diameter of the extension is substantially the same as the outside diameter of the downwardly projecting columns.

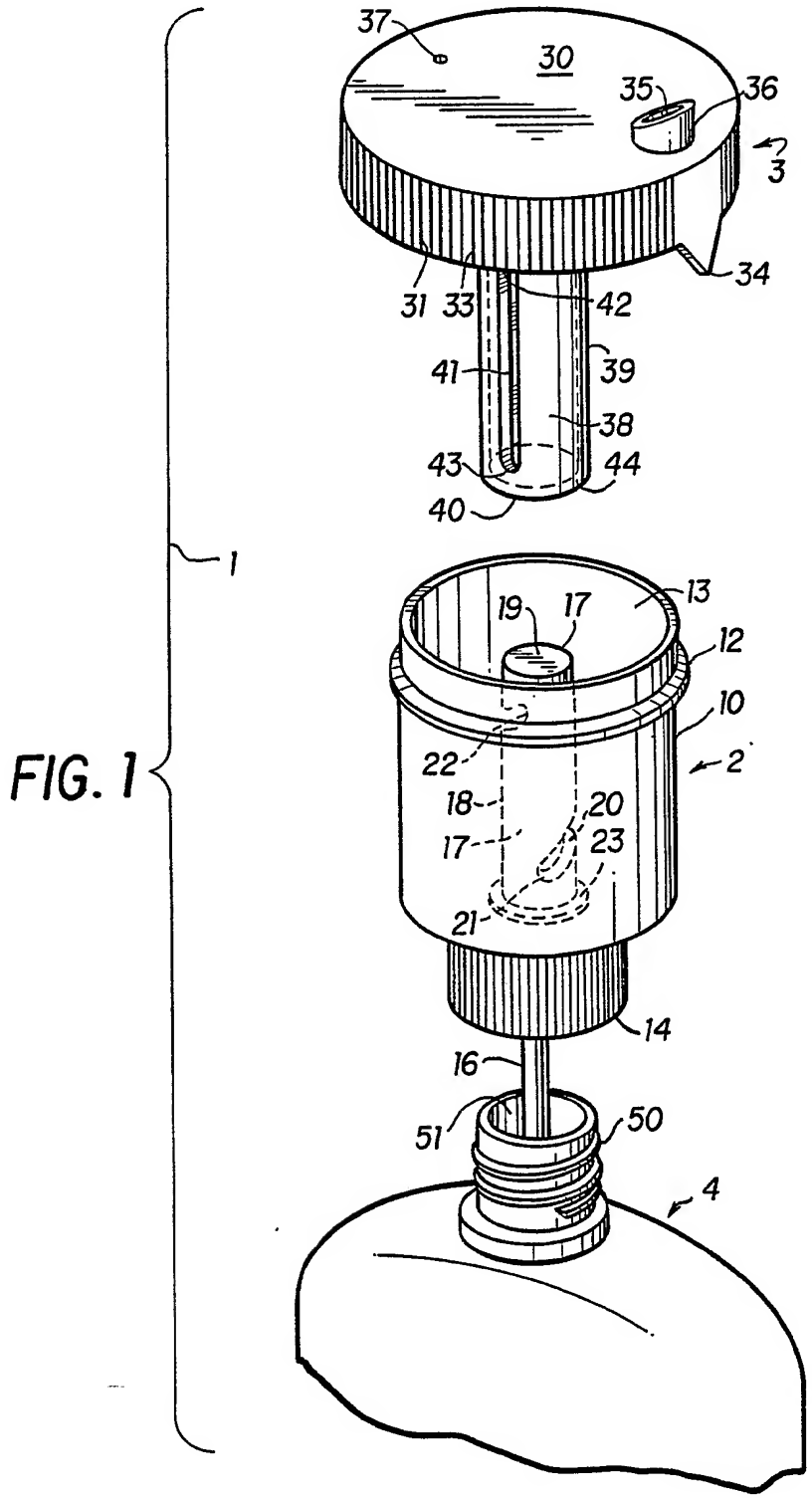

FIG. 1

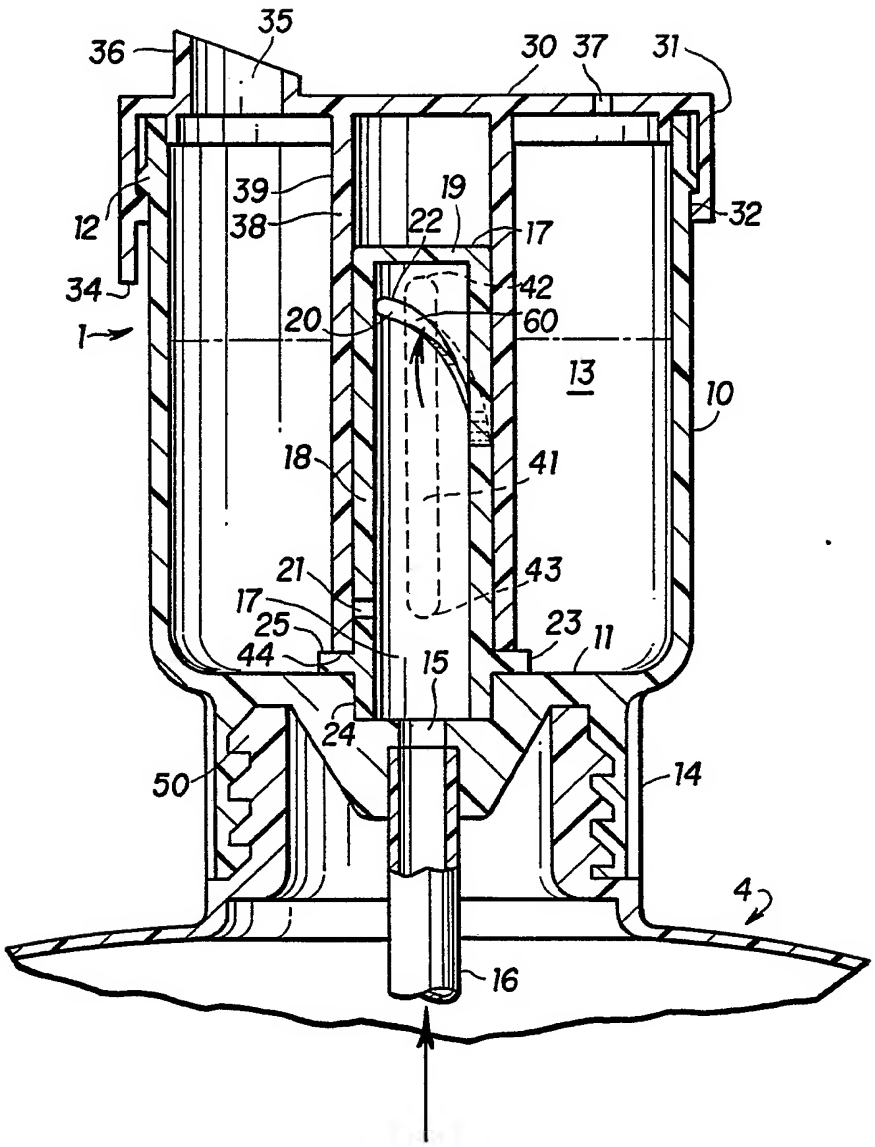

FIG. 2

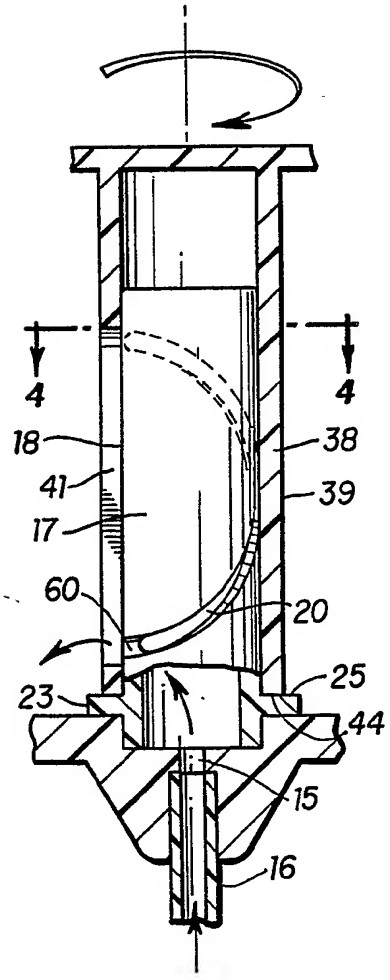

FIG. 3

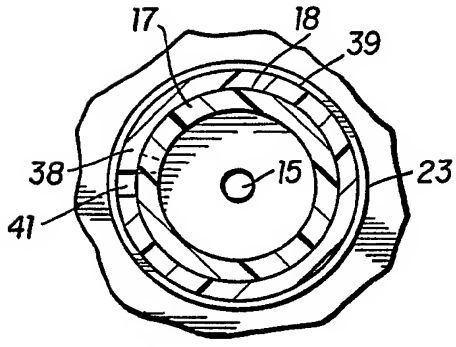

FIG. 4

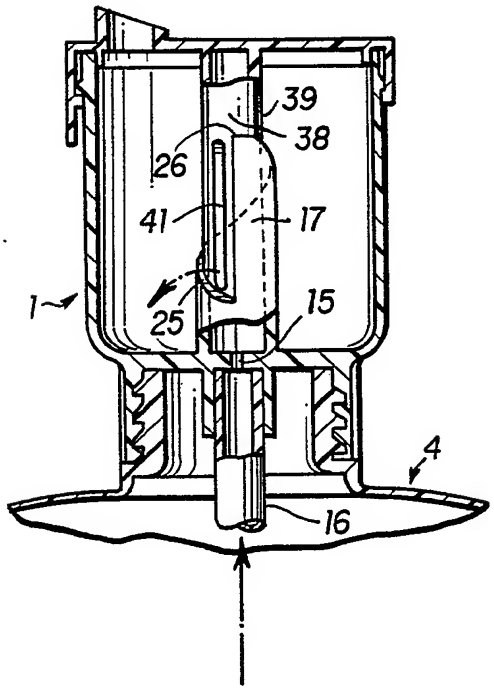

FIG. 5

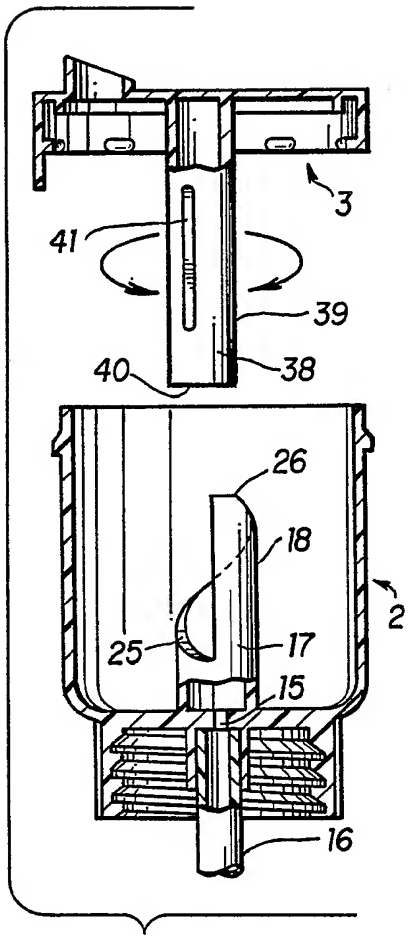

FIG. 6

European Patent Office

EUROPEAN SEARCH REPORT

Application number

DOCUMENTS CONSIDERED TO BE RELEVANT

EP 89302016.4

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
D,X	US - A - 4 143 794 (STRATFORD et al.) * Totality; especially abstract; fig. 2-5,8 *	1,2,4-8,10-12,14,16-18	G 01 F 11/26 B 65 D 47/20 G 01 F 11/10
A	GB - A - 2 183 217 (MERCK & CO.INC.) * Abstract; fig. 1 *	1,6,14	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

G 01 F 11/00
B 65 D 1/00
B 65 D 25/00
B 65 D 47/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	28-06-1989	FIALLA

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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